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EXAMINER	
PADGETT, MARIANNE L	
ART UNIT	**PAPER NUMBER**
1762	6

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Please find below and/or attached an Office communication concerning this application or proceeding.

5

Office Action Summary

Application No.	Applicant(s)
09/762,881	Narange et al
Examiner	**Group Art Unit**
M.L. Padgett	1762

—The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address—

Peri d for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

☒ Responsive to communication(s) filed on 3/27/01.

☐ This action is **FINAL.**

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 1 1; 453 O.G. 213.

Disposition of Claims

☒ Claim(s) 1-21 is/are pending in the application.

Of the above claim(s) _____ is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 1-21 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claim(s) _____ are subject to restriction or electi n requirement

Application Papers

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Pri rity under 35 U.S.C. § 119 (a)–(d)

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119 (a)–(d).

☐ All ☐ Some* ☐ None of the:

☐ Certified copies of the priority documents have been received.

☐ Certified copies of the priority documents have been received in Application No. _____.

☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a))

*Certified copies not received: _____.

Attachment(s)

☐ Information Disclosure Statement(s), PTO–1449, Paper No(s). _____

☒ Notice of Reference(s) Cited, PTO–892

☐ Notice of Draftsperson's Patent Drawing Review, PTO–948

☐ Interview Summary, PTO–413

☐ Notice of Informal Patent Application, PTO–152

☐ Other _____

Office Action Summary

1. Claims 1-21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1, line 4 "reducer" lacks a correct article for showing antecedent basis, as it also does in claim 6. It is also noted that "desired pattern" provides for no particular effect, and one could desire an entire surface to be coated with solution as when one is spin coating, if complete coverage is the pattern one desires. While applicant may desire the pattern to be related to the printing, such a relationship is not clearly claimed.

Use of relative terms that lack clear metes and bounds, either in the claim, the description, or relevant cited prior art, are vague and indefinite. In claim 2, see "active" (how or with what or for what purpose is the component active?); in claim 3 "integrated" (with what is the component integrated?); in claim 7 "strong"; and in claim 11 "pure" (pure in what way? As in only metal deposits or there is only one metal present, etc. ...).

In claims 9, 13, 14 and 15 "the step of" lacks proper antecedent basis due to inconsistent terminology, as claim 1 does not use the word "step".

In claim 10 "the layers" lacks proper antecedent basis, as previous possibly related (but not necessarily) limitations of "first layer" and "at least one additional layer" are differentiate therefrom by modifiers.

In claim 14, line 3, "second reducer" lacks a correct article for showing antecedent basis, while in line 5 "a redox reaction" is not differentiated (as with --second, --) from the same limitation on line 6 of claim 1. Claim 16 has analogous problems. Furthermore in 16, the relationship of the "successive deposits" to any of the

layers from claim 1 is not defined, hence unclear, while in line 7 "the layers" lacks proper antecedent basis, with "at least two" immediately preceding it, being non-idiomatic.

In claims 17-18, it is noted that the percentage of particulates includes none being present.

In claim 19, it is unclear how "a pattern" (line 5) relates to "a desired pattern" added to claim 1, and the former lacks either clear differentiation or an article showing antecedent basis. The pattern in line 6 (and claim 20) is vague and indefinite, as it could refer to either. Also in line 6 "a redox reaction" has an unclear relationship to the like limitations in claims 1, 14 and 16, etc.

In claim 1, it appears that "an electrical component" includes a surface plus 2 or more layers, hence lacking a clear description, claim 19 would have trouble connecting plural components that are all on different surfaces by the steps as claimed.

2. Claims 9 and 15 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The specification is objected to because it fails to contain an adequate written description of applying the first solution using a rotation plate as it is using in claim 9. The description is inadequate because no mention of using a rotating plate (or spin coating) was found in the body specification. Various application techniques were discuses on p. 15-18 under "Applying the solution..." and these also related to patterning. Pages 14-15 under "Solubilizing..." also discussed some of the same, but

no discussion of a rotating plate was found, and none as it might relate to the amendment of "a desired pattern". Relative movement was generically mentioned (p. 15); a roll dispenser, but that rotates a cylinder not a plate; and on page 16 "the applicator need not translate..., but may tilt or rotate....", however an applicator is not a plate. Therefore, the specification fails to adequately describe the above claimed feature.

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 6-7, 9-11 and 17-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Baum et al (IBM Tech. Disc. Bull).

Baum et al (IBM) teach deposition of a solution which contains iron (III) oxalate and palladium (II) salts (but no particles) on a substrate via processes, such as spraying or spin coating, then using UV exposure to initiate the reduction reaction, which effects result on of the surface features. Thereafter, a further layer of Cu is deposited via an electroless-plating bath. It is noted that since the claimed "desired pattern" has no requirements other than it is wanted, and it may be effected by use of spraying or a rotation plate, that Baum et al who desire to coat their substrate via spraying or spin coating (i.e. a rotating plate is used), before initiating their redox reaction, apply their solution in a pattern they desire.

5. Claims 1-3, 6-7, 9-11 and 17-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Baum et al (Photo selective circuitization...)

Baum et al (Photo. circuitization.) is very similar to Baum et al (IBM) discussed above. In addition, it has extensive discussion of the techniques used in circuit construction, including mention of IC (integrated circuit) packaging in the introduction and conclusion, hence providing for integrated components, and ones that are "active" within the broad undefined possible meanings of the word. Also, this Baum et al article discusses particular details of their Cu coating procedure that include the use of formaldehyde as a reducing agent, hence the Cu plating technique used in completing their component is also a redox reaction.

6. Claims 1, 6-7, 10-11, 14 and 17-18 are rejected under 35 U.S.C. 102(e) as being anticipated by Lee et al.

Lee et al teach reducing sites on a polymer substrate to create active surface sites, where selectivity may be obtained by use of a resist mask or a permanent resist on the polymeric film, then an electrolyte solution including solubilized metal cations, such as Pd, Pt, Ag, Au, Cu, Co or Cu; an aprotic solvent; and a supporting electrolyte salt (no particles), is deposited (when a mask is used as taught only the desired pattern is deposited) and a redox reaction initiated. Lee et al can be said to complete their product with the addition of the inspection layer that is a redox deposition of a light reflective metal, such as Pd.

7. Claims 1-4, 6-8, 10-11, 14 and 17-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Krause et al.

Krause et al teach patterned metallization of a surface, which is first masked, then activated via charge injection from, a solution to form part of a redox couple. Subsequently, reduction of metal ions in a solution applied to the masked surface, applies that solution in a desired pattern that then undergoes reduction. Metals, such as Cu, Co, Au, Ni, etc., are taught to be deposited and the examples contain materials used in the redox couples that include acetates, nitrates (claim 19), etc. After the initial coating of the metal, further metal may be electroless plated, including by redox reaction processes. Taught uses discuss employment in integrated circuits, electronics, imaging, solar cells (a power source), photovoltaic devices, etc. Note the last two mentioned uses are types of power sources, and all have 'active' components deposited by the above technique.

8. Claims 1-3, 6-8, 10-11, 14 and 16-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Makkaev et al.

Makkaev et al teach a process for electrochemical metallization of dielectrics, for electrical uses inclusive of through holes and multilayers, printed circuit boards, etc. A masked substrate may be treated with a solution for electrochemical metallization, such as one containing a strong oxidizing agent like Ca nitrate, and a strong reducing agent, such as hypophosphate ions. The deposition reaction is initiated by heating, where processes that use IR or UV radiation are suggested. Therefore, the metal layer can be build up by successive electrochemical deposition. Ex. 1 in col. 7 provides a teaching of multiple succeeding deposits, first one of Cu, then Ag.

9. Claims 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over over Makkaev et al or Krause et al or Lee et al or Baum et al (IBM or Photo.). .

None of these references explicitly teach steps of forming one set of components by the redox technique, then connecting them by the same technique, however they all teach use in general for the types of patterning required for such connectors, with Makkaev et al and Lee et al specifically mentioning producing multilayer/ multilevel products, hence in any of the references it would have been obvious to one ordinary skill to use the process of the above references for their intended purposes of metallization, whether it is a conductive component like an electrode, contact layer or a capacitor, etc., or one of the wiring lines that connect such components on circuit boards and integrated circuits, because all of such feature would have been expected to be equally effectively metallized by the above techniques.

10 Claims 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Makkaev et al in view of Cooper et al.

Makkaev et al teach heating of the deposited solutions to initiate the autocatalytic redox reaction, where the suggested heat sources are IR or UV radiation, but does not teach the claimed use of microwave radiation. In his background (col. 1, lines 17-24), Cooper et al teach that catalytic reactors that typically use thermal energy to facilitate their chemical reactions, derive it from IR radiation, direct heating or even microwave absorption which manifest itself as an elevated temperature. Therefore, it would have been obvious to one of ordinary skill in the art to use microwave heating in Makkaev et al as an alternative to IR heating, as it is old and well known as shown by Cooper et al as an equivalent heat source for analogous types of chemical reactions, hence would have been expected to be equally effective.

11. Claims 1-7, 10-12 and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Youtsey et al.

Youtsey et al teach screen printing inks that upon firing in an oxidizing atmosphere, form conductive pigment coatings. Use of these coatings is contemplated in microcircuits for active or passive components, where conductors, resistors, capacitors, etc., are mentioned. Note that as capacitors store energy, they are in essence a type of battery. Youtsey et al.'s ink (a solution) includes a non-noble conductive metal, such as Ni or Cu, plus at least one oxidizable material, such as B or Al. After screen printing (produces a desired pattern), firing in an oxidizing atmosphere will cause a redox reaction with the oxidizable material, i.e. Al goes to Al_2O_3, and will burn off the organic vehicle. While the deposit is conductive, it is not "pure" metal, but a

large majority is metal (Ex. I or II would have above 80 to 90% conductive metal in the fired deposit), hence as it would have been obvious to one of ordinary skill in the art to minimize non-metal contributions in order to maximize conductivity, so the resulting layer many approach "essentially pure metal". Youtsey et al do not teach metal oxide deposits as the whole composition of their deposited layer, however they do have minor amounts (less than 5%) of metal oxides is produced in their conductive deposits, and also teach in the background that silk screen patterned dielectrics can be deposited, and noting that control of composition and atmosphere effects degree of oxidation produced in the firing, therefore it would have been obvious to one of ordinary skill in the art that dielectric layers to complement the conductive layers, would have been usefully produced by like techniques, with suitable adjustments of composition and firing atmosphere to deposit metal oxides for the desired end use.

While screen printing Youtsey et al's inks for successive layers or stages of the microcircuits, i.e. components, are not discussed in the patent, 'one additional layer', then the wiring deposits to connect components, it would have been obvious to one of ordinary skill in the art to apply the techniques of Youtsey et al in order to form as many individual layers as are needed to form both the individual components, such as capacitors which generally have at least a series of conductive/dielectric/ conductive layers; or to form the overall circuits which appropriately connect the various layers/components, because all would have been effectively so deposited, but could not all have been simultaneously deposited, expected for the simplest of circuits.

12 Claims 9 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Youtsey et al as applied to claims 1-7, 10-12 and 19-21 above, and further in view of Cassat.

Youtsey et al only discuss screen-printing of their inks, however Cassat teaches that deposition techniques of both screen-printing and masking may be used for deposition of inks for circuit patterns. The examiner notes that use of rotating plates or jets (i.e. spraying) when using masks are conventional and typical procedure to enable deposit of solutions, such as inks over the mask surface, and as such would have been obvious to one of ordinary skill in the art to employ for their usual purposes of even or uniform deposition, etc. Also, note that Cassat is cumulative to Youtsey et al, in that it confirms the above assertions concerning repeated depositing and patterning via inks for any of the conductive, resistive or insulating layers, as old and well known in the art.

13 Other art of interest include Narang et al, PN 5,980,813 and 6,146,716 to over lapping inventive entities, which are on related topics, but have claims differing from those of the present case.

The patents to Cooper et al, Mathur et al, Bauchamp (967 and 484) and Ovshinsky et al, are also of interest as cited in the search report in the parent PCT case.

14. Any inquiry concerning this communication from the examiner should be directed to M. L. Padgett whose telephone number is (703) 308-2336. The examiner can generally be reached on Monday-Friday from about 8:30 a.m. to 4:30 p.m.; and fax phone numbers are (703) 872-9310 (regular); (703) 872-9311 (after final); and (703) 305-6078 (unofficial).

M.L. Padgett/dh
April 24, 2003
April 17, 2003

MARIANNE PADGETT
PRIMARY EXAMINER